

RUBY SNAPPERS (2023)

Etelis spp.



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STOCK STATUS OVERVIEW

Jurisdiction	Stock	Stock status	Indicators
Commonwealth, Queensland, New South Wales	Eastern Australia	Undefined	Catch
Commonwealth, Western Australia, Northern Territory, Queensland	Northern Australia	Sustainable	Catch, Fishing Mortality, SPR (spawning potential ratio)

STOCK STRUCTURE

Andrews et al. [2016] examined the phylogeny of deepwater snappers of the genus *Etelis* using two mtDNA loci and two nuclear introns. The analyses of Andrews et al. [2016] indicated that species identified as *Etelis carbunculus* is comprised of two distinct, non-interbreeding lineages separated by a deep divergence, i.e., it was comprised of two cryptic species, *E. carbunculus* and a larger *Etelis boweni* (described by Andrews et al. 2021). Both cryptic species exhibit overlapping Indo-Pacific distributions, with *E. carbunculus* being more widespread across the Indo-Pacific, whereas the larger *E. boweni* is reported mainly from the Indian Ocean and Western Central Pacific [Andrews et al. 2016]. While these two species are morphologically similar, there are differences in the coloration of the upper-caudal fin tip, the shape of the opercular spine, differences in adult body length, body depth, and head length, and otolith morphometrics that can be used to separate the species [Wakefield et al. 2014; Andrews et al. 2016]. These species are now commonly referred to as pygmy ruby snapper (*E. carbunculus*) and giant ruby snapper (*E. boweni*). The main species landed in northern Australian waters is *E. boweni* [Andrews et al. 2021].

Andrews et al. [2020] investigated the population structure of *E. carbunculus* and *E. boweni* (as well as *Etelis coruscans*) across their distributional range in the Indo-Pacific. Andrews et al.

[2020] examined a total of 1,064 specimens of *E. carbunculus* from 11 regions, and 590 specimens of *E. boweni* from 16 regions. Samples of *E. carbunculus* were analysed using mtDNA and 9–11 microsatellite loci, while *E. boweni* was analysed with mtDNA only. *Etelis carbunculus* exhibited low but significant levels of isolation for the Hawaiian Archipelago, and divergence between Tonga and Fiji. *Etelisboweni* exhibited little structure except a strong pattern of isolation for both Seychelles and Tonga at the edge of their distribution (east and west, respectively). This indicates populations are structured on the wider scale of ocean basins and the capacity for widespread dispersal throughout the Indo-Pacific region. As such, Australian populations of Ruby Snappers are likely to form a single biological stock in the Western Pacific area (east coast) and the eastern Indian Ocean area (west coast).

Here, assessment of stock status of Ruby Snappers is presented at the biological stock level—Northern Australia (Western Australia, Northern Territory, Commonwealth, Queensland); and Eastern Australia (Queensland, Commonwealth, New South Wales).

STOCK STATUS

Eastern Australia

In Queensland, Ruby Snapper species are reported as a single group, likely comprised primarily of *Etelis carbunculus* and *Etelis boweni*, but potentially also including similar-looking species (e.g. Flame Snapper, *Etelis coruscans*). Additionally, some catch of Ruby Snappers may be reported in the Unspecified Tropical Snapper catch category. Commercial harvest of Ruby Snapper in Queensland is constrained by a multi-species Total Allowable Commercial Catch, in addition to species-specific harvest control rules as part of the newly implemented Reef Line Fishery Harvest Strategy [QDAF 2020]. For secondary target and by-product species like Ruby Snapper, this includes catch reference points that trigger stock assessments and implementation of a species-specific Total Allowable Commercial Catch. Estimated commercial catch has stayed consistently low over the past decade (less than 3 tonnes (t)). Most recent catch estimates were 2 t and 76 days effort in 2021-22. The recreational harvest of Ruby Snapper in Queensland is considered to be low with no reported catch in the most recent recreational fishing survey [Teixeira et al. 2021].

Catch of finfish in the Commonwealth Coral Sea Fishery (CSF) is also managed as a diverse group of species, including the Ruby Snapper species group, caught by line gears and there are no species-specific catch limits. Commonwealth commercial catch of the Ruby Snapper species group averaged less than 1 t per annum during 2017–18 to 2021–22 financial years and was less than 1 t in the 2021–22 financial year. Line fishing in the Commonwealth managed part of the stock is unlikely to be having a negative impact on the stock.

In NSW, two species from the genus *Etelis* are reported in commercial catches; the Flame Snapper (*Etelis coruscans*) and Ruby Snapper (*E. carbunculus*). This assessment presents only data for the latter. Reported catch of Ruby Snappers in NSW is very low, with the total commercial catch since 2016 below 1 t per year and recreational and indigenous harvest are unknown.

No formal stock assessments have been undertaken to quantify biomass levels of Ruby Snapper on the east coast of Australia, and there are no estimates of indigenous or recreational harvest for this species or species complex. The reported catch is low relative to the distribution of the species on the east coast. There is insufficient information available to confidently classify the status of this stock.

On the basis of the evidence provided above, the Eastern Australian biological

stock is classified as an **undefined stock**.

Northern Australia

The assessment of the stock status of Ruby Snapper in Northern Australia is based on an assessment of the relative contributions of catch from each jurisdiction and a formal assessment using a catch curve and per-recruit analyses based on age composition data of *E. boweni* in Western Australia. The Ruby Snapper complex comprises two species, *E. carbunculus* (pygmy ruby snapper) and *E. boweni* (giant ruby snapper) [Wakefield et al. 2014]. These two cryptic species are sympatric and typically co-occur in catches throughout their distribution. The main species landed in northern Australian waters is *E. boweni*. Ruby snappers in North Western Australia are landed predominately by commercial line fishers in the Pilbara Line Fishery, Gascoyne Demersal Scalefish Managed Fishery, West Coast demersal Scalefish (Interim) Managed Fishery and in small quantities by trap fishers in Northern Demersal Scalefish Managed Fishery and the Commonwealth's Western Deepwater Trawl Fishery. The Giant Ruby Snapper is one of the indicator species for North Western Australia [Newman et al. 2018] and as such the stock status of Ruby Snapper contributes to determining the risk-level for the biological sustainability of the deep water demersal scalefish resources in North Western Australia. An assessment using catch curve and per-recruit analyses based on representative age composition data of Giant Ruby Snapper has also been undertaken for North Western Australia. Fishing mortality based estimates are assessed relative to reference levels based on ratios of natural mortality [DPIRD 2017]. Assessment models are also used to estimate a female spawning potential ratio (SPR, based on female spawning biomass per recruit) using a traditional per-recruit model assuming constant recruitment (SPR). In the absence of a direct estimate of B_{MSY} for the stock, the estimates of SPR for females in 1997 and 2011 were compared to a proxy reference level based on a proportion of the unfished spawning biomass, $0.3 B_0$. Where $0.3 B_0$ is considered a proxy threshold level for State-managed Western Australian fisheries and is consistent with B_{MSY} estimates [Wakefield et al. 2020]. This assessment of Giant Ruby Snapper is supported by predictions for biomass and harvest rates from a data-limited Catch-MSY assessment model compared periodically to a median model estimate for maximum sustainable yield (MSY).

The stock assessment for Giant Ruby Snapper (*Etelis boweni*) in the North Western Australia region of Northern Australia is based on an assessment of fishing mortality derived from catch curve analysis of representative samples of the age structure [Wakefield et al. 2020]. Point estimates of fishing mortality ($F = 0.038$ [1997] and 0.052 year^{-1} [2011]) and associated confidence limits were well below the value for natural mortality (M) of 0.11 year^{-1} , indicating that, on average over the life span of the fish in the samples, exploitation has been relatively low. Estimates of mortality and selectivity from 1997 and 2011, and analyses of the female relative spawning potential ratio suggest the *Etelis boweni* stock in North Western Australia region has remained at around 60% of the unfished level over the years represented by the age composition sample [Wakefield et al. 2020]. Given that this species is longer lived than *E. carbunculus* [see Williams et al. 2017] and is more dominant in catches, the status of this species is considered to represent the status of Ruby Snappers in the Northern Australia stock. Catches across the distributional range of *Etelis boweni* are low.

The total catch of Ruby Snappers in WA have been variable over the last 10 years (2013–2022), ranging from 15.4–41.7 t, with a mean annual catch of 28.5 t. This is considerably lower than the average catches across the previous 10

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years of 69.6 t. The recreational and charter catch are relatively low compared to the commercial catch, in the past 10 years where reliable catches estimates are available, the proportion of the total catch has averaged 25%. The Commonwealth commercial catch in the Western Deepwater Trawl Fishery, operating off the West Australian Coast has been variable over the last decade (2012–13 to 2021–22 financial years), ranging from 0 to 21 t (5 t in 2021–22; 2 t in 2020–21). Analyses using a Catch-MSY model applied to data on annual catches for this species (1993–2022) in Western Australia, demonstrated that the annual catches since 2013 have remained below the median model estimate for maximum sustainable yield (MSY), after having been above the 95% CI of MSY for the period of 2001–2012. This is also consistent with the predicted values for biomass increasing in recent years to just below BMSY, and fishing mortality remaining below FMSY. However, it is important to recognise that Catch-MSY is a data-limited technique with relatively strong assumptions, dependent on user inputs. For this assessment, these included specified ranges for initial depletion (0.8–0.975), based on the late development of the deep water fishery and the species are not exploited continually across the entire distribution, final depletion (0.15–0.7), based on recent catches relative to maximum recorded annual catch and the non-targeted nature, and low resilience ($r=0.1-0.6$, consistent with species longevity, of ~32 years). For the Northern Territory part of the management unit, only relatively small catches are recorded in the Timor Reef fishery. Targeting of Ruby snappers by this fishery is constrained by the fact that this species distribution largely resides outside of the fishery boundary. As a result, during the period 2013–2022 the average annual catch by this fishery was less than 2.5 t. Additionally, the offshore distribution of Ruby Snapper in NT waters means that the recreational and Fishing Tour Operator landings are likely to be insignificant. Commercial harvest of Ruby Snapper in the eastern Gulf of Carpentaria is managed as part of the 'other species' quota category in the GOCDFFTF (largely inactive since 2016), which comprises other reef finfish species. Ruby Snapper is also commercially harvested by the GOCLF where there are no caps on total catch at the species or complex level. Catch has not been recorded in either Queensland fishery since 2008, when a total of 8.3 t was recorded. The above evidence indicates that the biomass of Ruby Snappers is unlikely to be depleted, and the current level of fishing mortality is unlikely to cause the stock of Ruby Snappers to become recruitment impaired.

On the basis of the evidence provided above, the Ruby Snappers species group in north-western region of Northern Australia is classified as a **sustainable stock**.

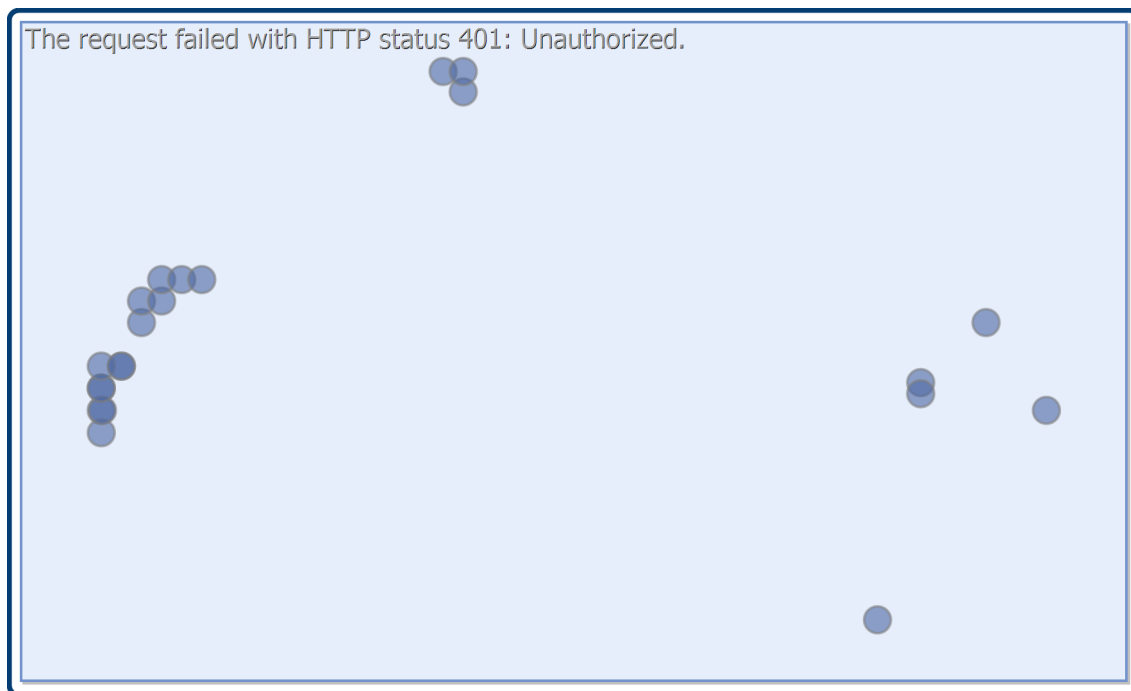
BIOLOGY

Ruby Snappers biology [Wakefield et al. 2020]

Species	Longevity / Maximum Size	Maturity (50 per cent)
RUBY SNAPPERS	Etelis sp. Eastern Indian ocean: 42 years, 1,127 mm FL	Etelis sp. Eastern Indian ocean: Length at 50% maturity (female: 527 mm FL, male: 456 mm FL), Age at 50% maturity (females; 5.4 years, males 4.4 years)

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DISTRIBUTION



Distribution of reported commercial catch of Ruby Snappers

TABLES

Fishing methods	Commonwealth	New South Wales	Northern Territory	Queensland	Western Australia
Charter					
Hook and Line		✓		✓	✓
Various					✓
Commercial					
Bottom Trawls					✓
Demersal Longline	✓				
Fish Trap					✓
Hand Line, Hand Reel or Powered Reels					✓
Hook and Line				✓	
Line				✓	✓
Otter Trawl	✓	✓			✓

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Trawl				✓	
Unspecified			✓		✓
Recreational					
Hook and Line		✓		✓	✓

Management Methods				
	Commonwealth	New South Wales	Queensland	Western Australia
Charter				
Bag limits				✓
Bag/possession limits			✓	
Gear restrictions		✓	✓	
License		✓		
Limited entry				✓
Marine park closures		✓		
Passenger restrictions				✓
Possession limit			✓	
Seasonal or spatial closures			✓	
Size limit				✓
Size limits			✓	
Spatial closures		✓		✓
Spatial zoning				✓
Commercial				
Effort limits				✓
Gear restrictions	✓	✓	✓	✓
Harvest Strategy			✓	
License	✓			
Limited entry		✓	✓	✓
Marine park closures		✓		

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Seasonal or spatial closures			✓	
Size limits			✓	
Spatial closures				✓
Spatial zoning				✓
Temporal closures		✓		
Total allowable catch			✓	✓
Total allowable effort				✓
Vessel restrictions		✓	✓	✓
Recreational				
Bag limits				✓
Bag/possession limits			✓	
Gear restrictions		✓	✓	
Licence (Recreational Fishing from Boat License)				✓
License		✓		
Marine park closures		✓		
Possession limit				✓
Seasonal or spatial closures			✓	
Size limit				✓
Size limits			✓	
Spatial closures		✓		✓

Catch	Commonwealth	New South Wales	Northern Territory	Queensland	Western Australia
Charter		Unknown		Unknown	1.1 t

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Commercial	5.223 t	0.0045 t	4.3125 t	2.19872 t	19.5056 t
Indigenous		Unknown		Unknown	Unknown
Recreational		Unknown		Unknown	6.6 t ± 2.39 t

Western Australia – Recreational (Catch). Boat-based recreational catch is from 1 September 2020–31 August 2021. These data are derived from those reported in Ryan et al. 2022.

Western Australia – Recreational (Management Methods). A Recreational Fishing from Boat Licence is required for the use of a powered boat to fish or to transport catch or fishing gear to or from a land-based fishing location.

Western Australia – Indigenous (Management Methods). Subject to application of Section 211 of the *Native Title Act 1993* (Cth), and the exemption from a requirement to hold a recreational fishing licence, the non-commercial take by Indigenous fishers is covered by the same arrangements as that for recreational fishing.

New South Wales – Recreational (Catch). Murphy et al. [2022].

New South Wales – Indigenous (Management Methods). <https://www.dpi.nsw.gov.au/fishing/aboriginal-fishing>

Queensland – Indigenous (Management Methods). For more information see: <https://www.daf.qld.gov.au/business-priorities/fisheries/traditional-fishing>

Queensland – Commercial (Catch). Queensland commercial and charter data have been sourced from the commercial fisheries logbook program. Further information available through the Queensland Fisheries Summary Report: <https://www.daf.qld.gov.au/business-priorities/fisheries/monitoring-research/data/queensland-fisheries-summary-report>

Queensland – Recreational Fishing (Catch). Data with high uncertainty (Residual Error > 50 %) has been excluded and listed as unknown. More information available at: <https://www.daf.qld.gov.au/business-priorities/fisheries/monitoring-research/monitoring-reporting/statewide-recreational-fishing-surveys>

Queensland – Commercial (Management Methods). Harvest strategies available at: <https://www.daf.qld.gov.au/business-priorities/fisheries/sustainable/harvest-strategy>

Northern Territory – Charter (Management Methods). In the Northern Territory, charter operators are regulated through the same management methods as the recreational sector but are subject to additional limits on license and passenger numbers.

Northern Territory - Indigenous (Management Methods). The Fisheries Act 1988 (NT), specifies that: “Unless expressly provided otherwise, nothing in this Act derogates or limits the right of Aboriginal people who have traditionally used the resources of an area of land or water in a traditional manner to continue to use those resources in that area in that manner.”

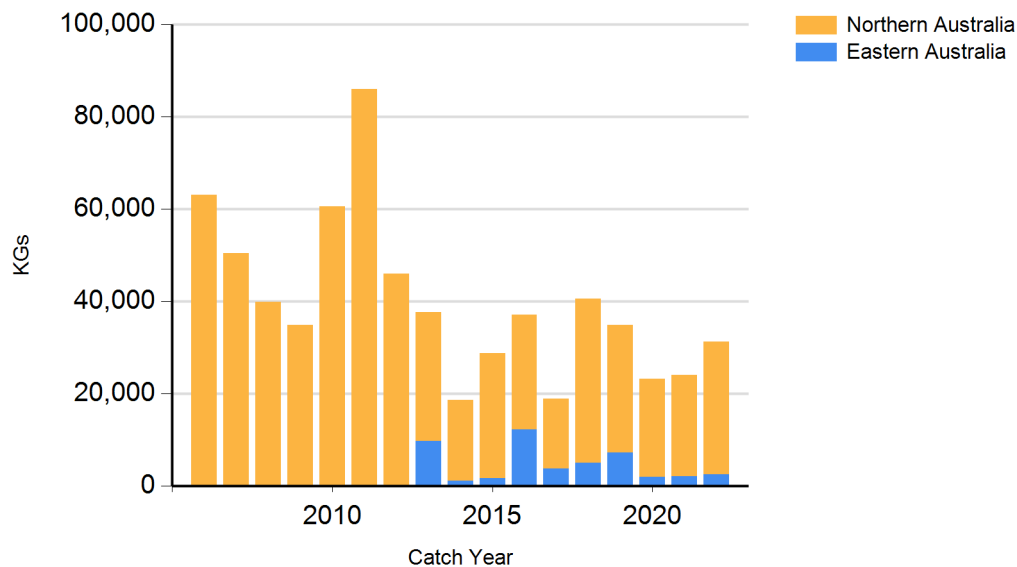
Commonwealth – Commercial (Management Methods/Catch). Data provided for the Commonwealth align with 2021–22 financial year.

Commonwealth – Recreational. The Australian government does not manage recreational fishing in Commonwealth waters. Recreational fishing in Commonwealth waters is managed by the state or territory immediately adjacent to those waters, under its management regulations.

Commonwealth – Indigenous. The Australian government does not manage non-commercial Indigenous fishing in Commonwealth waters, with the exception of Torres Strait. In general, non-commercial Indigenous fishing in Commonwealth waters is managed by the state or territory immediately adjacent to those waters.

CATCH CHART

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Commercial catch of Ruby Snappers - note confidential catch not shown

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